FORMULA FOR APPROXIMATION OF THE RATIO OF THE SATURATION VAPOR PRESSURE OVER ICE TO THAT OVER WATER AT THE SAME TEMPERATURE

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It is necessary on occasion to convert vapor pressure over water to the equivalent vapor pressure over ice, or vice versa. For this purpose, tables of the ratio of the saturation vapor pressure over ice to that over water are included in the Smithsonian Meteorological Tables [1].

When such conversions are needed in a computer program, the following approximation formula computes the ratio to within 0.1 percent accuracy for the range $0°\ \text{C.} \geq t \geq -50°\text{C.}$:

$$\frac{e_i}{e_w} \cong 1 + .00972t + .000042t^2 \qquad (1)$$

where e_i is saturation vapor pressure over ice for temperature t in °C., and e_w is saturation vapor pressure over water for temperature t in °C.

The equivalent equation for temperature t in °F. is

$$\frac{e_i}{e_w} \cong .8405 + .00457t + .000013t^2 \qquad (2)$$

It is worth noting that the above equations might be useful in conjunction with a previously published formula for computing saturation vapor pressure over water [2].

REFERENCES

1. R. J. List (Ed.), "Smithsonian Meteorological Tables," 6th Rev. Ed., *Smithsonian Miscellaneous Collections*, vol. 114, The Smithsonian Institution, Washington, D.C., 1951 (reprinted with corrections, 1963), 527 pp. (p. 370).
2. J. F. Bosen, "A Formula for Approximation of the Saturation Vapor Pressure over Water," *Monthly Weather Review*, vol. 88, No. 8, Aug. 1960, p. 275.

[*Received September 15, 1964*]